

Research Statement

My research, broadly speaking, covers two different but related research questions. The first corresponds to how individuals make inference and form belief with information. Using both theoretical and experimental approaches, I explore the mechanism behind different well-documented behaviors of belief formation¹, in particular on their relationship with bounded ability. The second builds on my understanding of belief formation and investigates its implications on the market or societal outcomes, for example on competition in retail markets or elections.

Belief formation with limited ability. Bayesian learning has been widely used in the economics literature and viewed as the benchmark model of belief formation. However, since [Kahneman et al. \(1982\)](#), both economics and psychology literature has documented different learning behaviors that depart from the Bayesian model. Although belief formation with the Bayesian rule is statistically optimal, in reality, individuals often face constraints of cognitive ability or attention that prevent them from updating perfectly their beliefs with all information. This first strand of my research aims to study how individuals with limited ability or attention form belief, in particular on how this limited ability of belief updating drives different departures from Bayesian learning and different well-documented behavioral anomalies.

In the presence of information overload, we often have to decide whether to process or ignore pieces of information given our limited time or attention. To efficiently use our limited attention may involve selectively processing or ignoring information. Motivated by this idea, [Leung \(2020a\)](#), titled “[Limited cognitive ability and selective information processing](#)” and published in *Games and Economic Behavior*, studies how individuals choose to update or ignore signals when they face a capacity constraint of how many signals they can memorize/update their belief with. Consider a decision-maker (DM) who aim to match his action with an unknown state of the world. He receives at most T signals sequentially, and upon receiving a signal at period t , he decides whether to memorize the signal and updates his belief (with Bayesian formula) or to ignore the signal and keep his belief unchanged. Assume the DM can memorize only $\bar{T} < T$ signals and cannot return to previous signals, he faces a trade-off between using one unit of the capacity for the current signal or saving it for future signals.

Given this trade-off, I show that the optimal strategy of the DM is to process only signals that are strong (informative) enough and tend to process signal that supports a favorable state (wishful processing). Moreover, when the DM is à priori confident enough about a state, the optimal strategy exhibits confirmation bias: given fixed the signal strength, the DM tends to process belief-confirming signals but ignore belief-challenging signals. Motivated by this finding, my other project [Goette et al. \(2020\)](#), titled “[Information overload and Confirmation Bias](#)”, tests the result on confirmation bias in an experimental setting. The existing literature on confirmation bias has overlooked the connection between the bias and the decision environment. In contrast, we show in the experiment that fixing the

¹Consider for example confirmation bias, wishful processing, use of heuristics, correlation neglect, inattentive learning, persistent disagreement.

information received by the subject, an increase in the difficulty of information processing strengthens confirmation bias which supports the aforementioned theory. Both projects shed light on how information overload and the Internet may strengthen confirmation bias and polarization.

My job market paper [Leung \(2020b\)](#), titled “Learning in Small/Big World”, continues the investigation to this research question by studying how learning behaviors change with complexity of the decision environment and cognitive ability of individuals. Different “biased” learning behaviors are often attributed to the complexity of employing Bayes’ rule, but to the best of my knowledge, no study has formally analyze how complexity affect learning and what kind of learning behaviors could arise in complicated inference problems. I analyze the (almost) optimal belief updating mechanism of an individual as he guesses which of N possible states of the world is true with bounded memory characterized by a M -memory states automaton. In this setting, N measures the complexity of the inference problem while M corresponds to the cognitive ability of the DM. Small worlds refer to the case where $\frac{N}{M}$ is small and big worlds correspond to a larger $\frac{N}{M}$.

I show that with this setup of bounded memory, first, asymptotic learning is close to Bayesian in small worlds but not in big worlds; second, ignorance behavior, e.g., the use of heuristics, correlation neglect, persistent over-confidence, inattentive learning and other behaviors of model simplification or misspecification, could be optimal in big worlds but is never optimal in small worlds; third, disagreement could persist in big worlds but not in small worlds. Moreover, different from the existing literature that studies disagreement, I show that two individuals who share the same prior belief and objective information structures but have different levels of cognitive ability can disagree with certainty after receiving infinitely many public signals.

On one hand, this strand of research explains different behavioral anomalies, including wishful processing, confirmation bias, ignorance learning, and others, under the same mechanism of efficient allocation of cognitive resources (attention, memory, etc.). This contributes to advance behavioral economics to a more unified framework to study individual behaviors. On the other hand, the results explain not only the existence of behavioral anomalies, but also shed light on how these anomalies change with the characteristics of the decision environment (information overload, complexity, etc.). They thus explain the heterogeneity of these “biased” behavior across different individuals and situations and provide policymakers a tool to “de-bias” if needed.

Effects of information and learning behaviors on markets and society. The second strand of my research builds on my understanding of information and learning behavior to draw implications on market outcomes and shed light on welfare implications of different public policies.

[Johnen and Leung \(2020\)](#), titled “Distracted from comparison: product design and advertisement with limited attention”, studies firms’ product design and advertising decisions in a duopoly setting where consumers are endowed with limited attention and face a trade-off between depth vs breadth: they either study a product in details and learn the match value or browse through the prices of the alternatives. In equilibrium, firms mix between different prices and product/information designs. Moreover, low prices are coupled with

a mass-market design where match values are concentrated and high prices are coupled with niche design where match values are more dispersed. We find that allow firms to disclose more product information induces a distraction effect: consumers are incentivized to search for product information and are distracted from comparison shopping. This distraction effect weakens price competition and hurt consumers. An advertisement ban in contrast restricts information disclosure and improve consumers welfare². We also discuss in what scenarios promoting entry could hurt consumers surplus as firms are incentivized to avoid price competition by diverting consumers' attention from comparison shopping.

In an on-going project [Leung and Yildirim \(2020\)](#) joint with Pinar Yildirim from Wharton School of the University of Pennsylvania, titled "Social media & competition: does low entry barriers strenthen incumbency advantage", we study how the advancement of social media and information technology affects political competition. We show that On one hand, the technological advancement lowers the costs communication for politicians and intensifies political competition by allowing many to enter political arena. However, incumbency advantage may be strengthened rather than weakened as an outcome of higher number of entrants into the political market. In particular, we show an asymmetric bad-news-good-news effect where early negative news hurts the challengers more than the positive news benefit them, such that in aggregate, an incumbent politician's chances of winning is higher with more entrants in the market.

Future Research. In the future, I will continue to work on both strands of my research, using both theoretical and experimental methodology. I believe that understanding better different behavioral anomalies or phenomenon is an important next step for the development of behavioral economics. Importantly, it also gives us a better understanding of the welfare implications of different policies as we better understand how they change individuals' "biased" behavior. Building on my job market paper, Lorenz Goette (University of Bonn and National University of Singapore) and I are planning to run an experiment to study individuals' trade-off between learning about different variables in multi-dimensional inference problems, which would shed light on our understanding of ignorance/inattentive learning behavior. I have also started a project, [Leung \(2020c\)](#) titled "Product diffusion in social networks", which studies how product and consumers characteristics, and consumers' network features affect the diffusion pattern of new products.

²See [Dubois et al. \(2018\)](#) for empirical evidence.

References

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